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ON THE POTENTIAL OF SPACEBORNE FAR-INFRARED RADIOMETRY FOR EARTH OBSERVATION

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Résumé :

More than 40% of the energy radiated to space by the Earth comes from the far-infrared (FIR, 15 <λ < 100 μm). Most of the atmospheric radiative cooling also occurs in this spectral region. However there is currently no spaceborne instrument monitoring the FIR emission of the Earth. Most infrared sensors (e.g. AIRS, IASI, MODIS) are indeed limited to the mid-infrared range (λ < 15 μm), essentially for technological reasons. As a consequence, the radiative properties of the atmosphere in the FIR remain poorly known, while they are critical for the energy budget of the atmosphere.
Here we highlight the potential of FIR satellite observations for a large range of applications : water vapour spectroscopy, water vapour profiling, climate feedbacks footprint detection, ice cloud remote sensing etc. We present the satellite projects currently in preparation, with a special focus on the Canadian mission TICFIRE (Thin Ice Clouds in the Far-InfraRed Experiment) dedicated to the observation of ice clouds. We show in particular that adding a few FIR spectral channels to existing spaceborne radiometers (e.g. MODIS) would greatly enhance our capability to characterize ice clouds physical properties, and hence improve our understanding of ice clouds formation, in particular in the polar regions and near the tropical tropopause. This provides strong arguments for supporting future FIR satellite projects.

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